

# Case Study: Assessing the Surface Water Quality of the Wallkill River and Black Creek within the Wallkill River Watershed

**Volunteer Monitoring Summit**

**Saturday, November 8, 2003**

**Session #4**

**11 / 03 – VM - J**

Wallkill River Watershed Management Group

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Watershed Specialist

Nathaniel Sajdak

Watershed Coordinator

# **Today's Mission**

**To share experiences and lessons learned from a volunteer monitoring program established to assess / characterize two key waterways within the Wallkill River Watershed:**

- the Wallkill River and**
- the Black Creek.**

# Today's Mission

## **The Presentation Covers:**

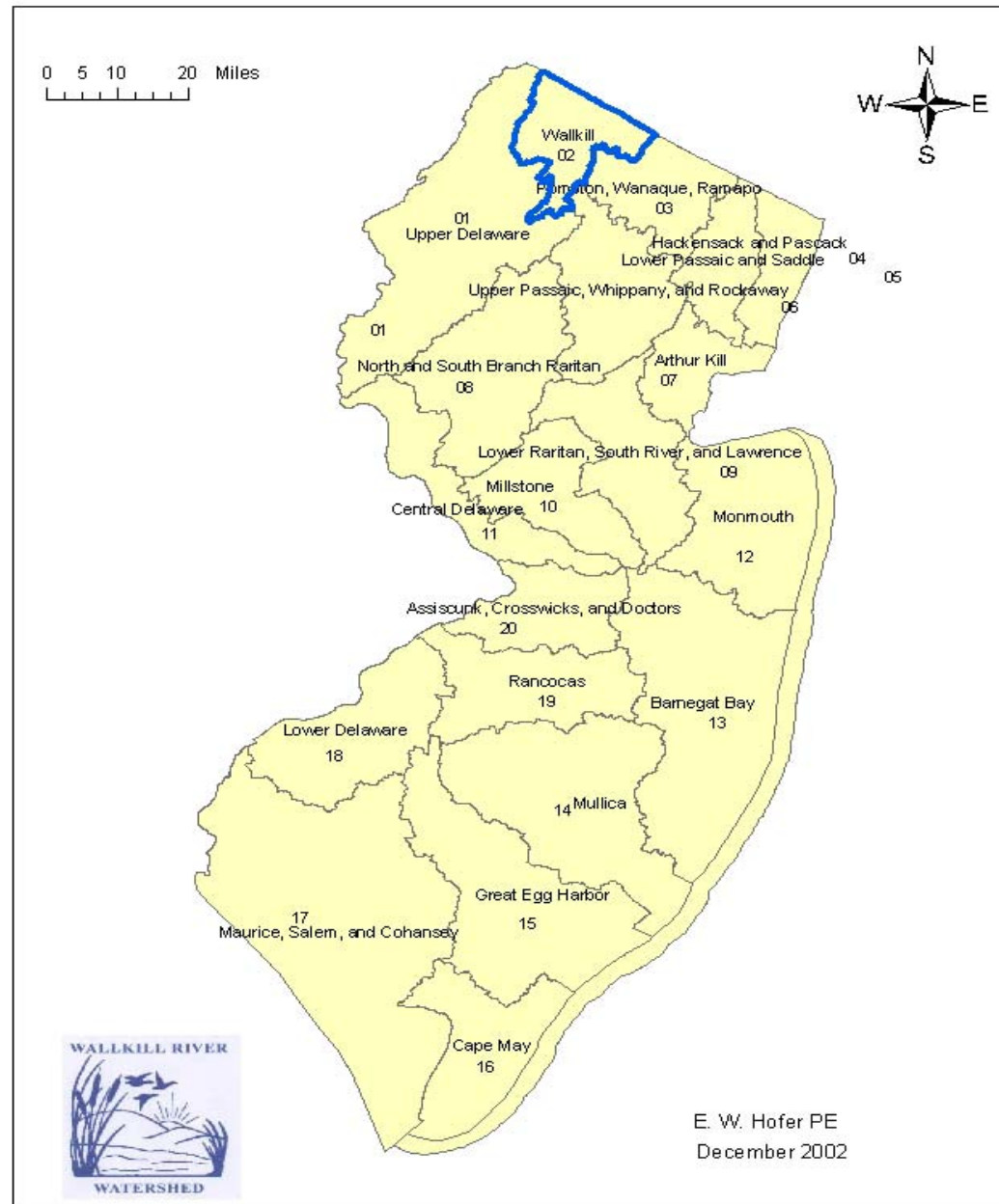
- 1. Program Development**
- 2. Planning**
- 3. Organization**
- 4. Protocol Selection**
- 5. Funding**
- 6. Development of Work Plan**
- 7. Field Sampling Protocols**
- 8. Data Analysis / Final Report**
- 9. Future Plans**

**The program was conducted by the Technical Advisory Committee of the Wallkill River Management Group.**

**The monitoring program led to several successful outcomes for the Watershed and for NJDEP.**

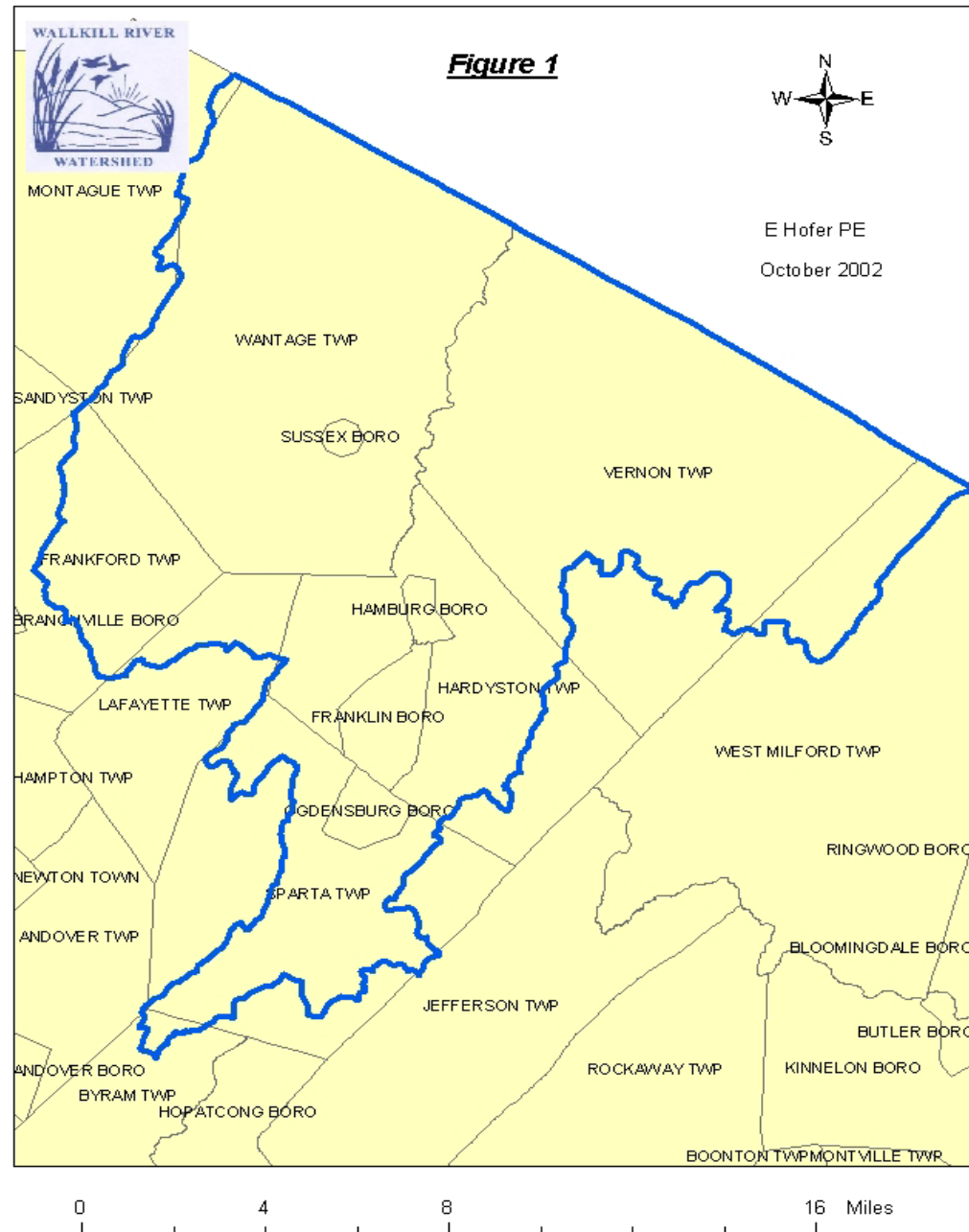
**Figure 1. NJDEP Watershed Management Areas**

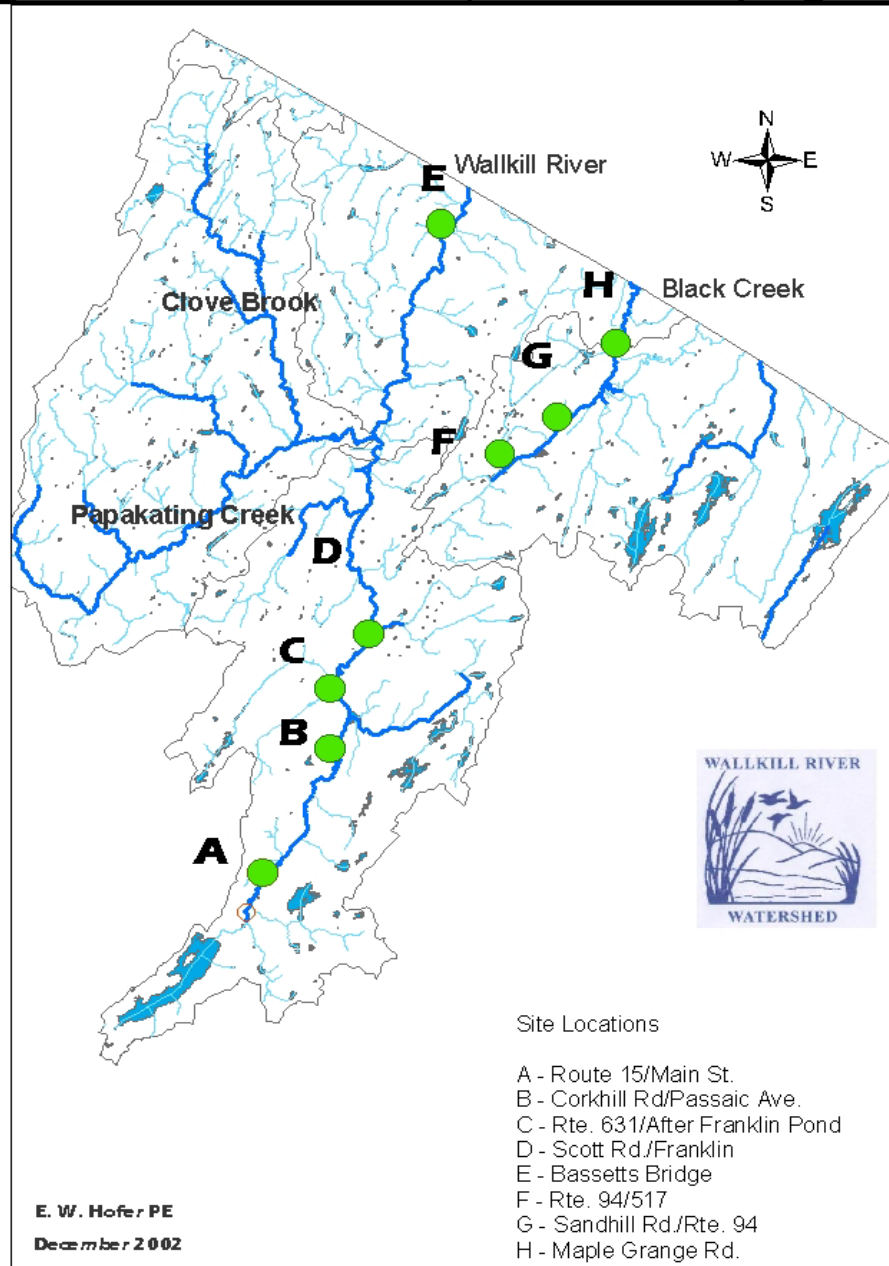
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# WMA 02 Municipalities

7





## Getting Started – Collecting / Assessing Current Information

- **Initial Assessment / Characterization Report by NJDEP**
- **303 (d) List**
- **305 (b) Impairment List**
- **Surface Water Quality Standards**
- **Ambient Stream Monitoring Network (ASMN)**
- **Ambient Biomonitoring Network (AMNET)**
- **Watershed Data**
- **EPA Storet Data**
- **Other Reference Information**

# What Did The 303 (d) & 305 (b) Lists Tell Us ?

- Impairments

Total Phosphorous

Water Temperature

Fecal Coliform

Metals (arsenic)



# Understanding Recent Watershed Changes

- **Reduction From 16 to 2 Annual Wastewater Facilities Discharging to Surface Waters (last 15 years)**
- **Large Percent of Land Use Changes Occurred After 1995/1997 NJDEP Aerials**
- **Changing Agricultural Land Patterns**
- **Impact of Non-point Source Pollution Loads**
- **Existing Data Sets of Surface Water Monitoring Results were Limited (size and reach locations)**

# **Building a Successful Monitoring Program**

- **Purpose**: stewardship, community assessment, and indicators (water quality)
- **Intended Data Uses**: assess current conditions and impairments, source track down of non-point pollution, and supplement NJDEP data collection

# **Building a Successful Monitoring Program**

- **Intended Data Users:**
  - NJDEP**
  - Wallkill River Management Group**
  - Local Decision Makers**
  - Local Health Departments**
- \* **Quality Need: Quality Assurance Project Plan (QAPP); Same as Quality Assurance / Quality Control Work Plan (QA/QC)**

# **Surface Water Quality Parameters of Interest**

- **Total Ammonia (nutrient / toxic to fish)**
- **Un-ionized Ammonia (calc.) (toxic to fish)**
- **Nitrate (health factor)**
- **Nitrite (converts to nitrate)**
- **Total Phosphorous (nutrient / algae growth)**
- **Dissolved Phosphorous (algae growth)**

# **Surface Water Quality Parameters of Interest**

- **Total Kjeldahl Nitrogen (TKN) (measure of organic / ammonia nitrogen)**
- **Total Dissolved Solids**
- **Conductance**
- **Water / Ambient Temperatures**
- **Dissolved Oxygen**
- **pH**
- **Flow (cubic feet / sec.)**
- **Latitude / Longitude Coordinates for Monitoring Sites (GPS)**

## **QA / QC Plan - Contents**

- **Objectives & Scope**
- **Data Usage**
- **Monitoring Network Design**
- **Parameters / Frequency**
- **Analysis Responsibilities**
- **Organization**
- **Data Quality Requirements**
- **Sampling Procedures / Custody Sheets**

# **QA / QC Plan - Contents**

- **Calibration / Documentation**
- **Audits**
- **Corrective Actions**
- **Reports**

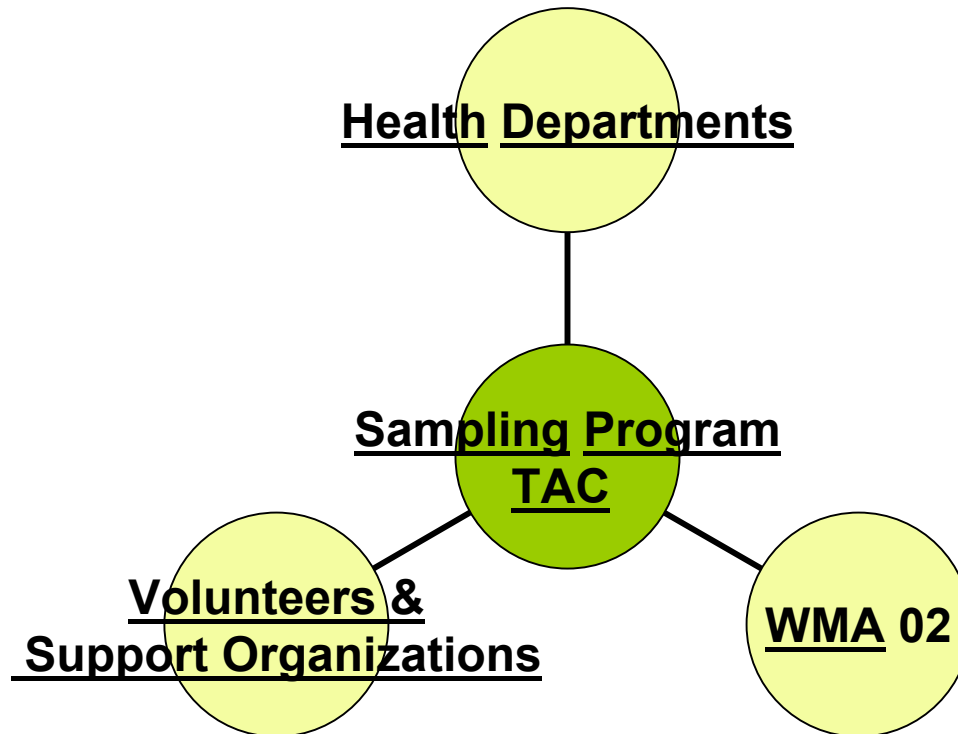
**QA / QC Manual Prepared by P. Kehrberger of HydroQual Inc.**

# Funding Considerations

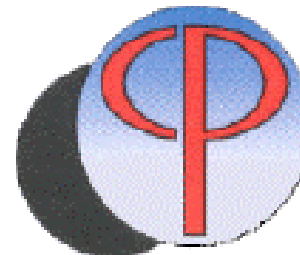
<u><i>Line Item</i></u>		<u><i>Dollars</i></u>	<u><i>Comments</i></u>
<b>Grant Funding Allocation</b>		<b>\$50,000</b>	<b>Includes \$40,000 for Outside Professional Services</b>
<b>In-Kind</b>		<b>\$20,000</b>	<b>Field Services, Supplies, Equipment</b>
<b>Total</b>		<b>\$70,000</b>	<b>12-Month Sampling Program</b>



# Volunteer Organization

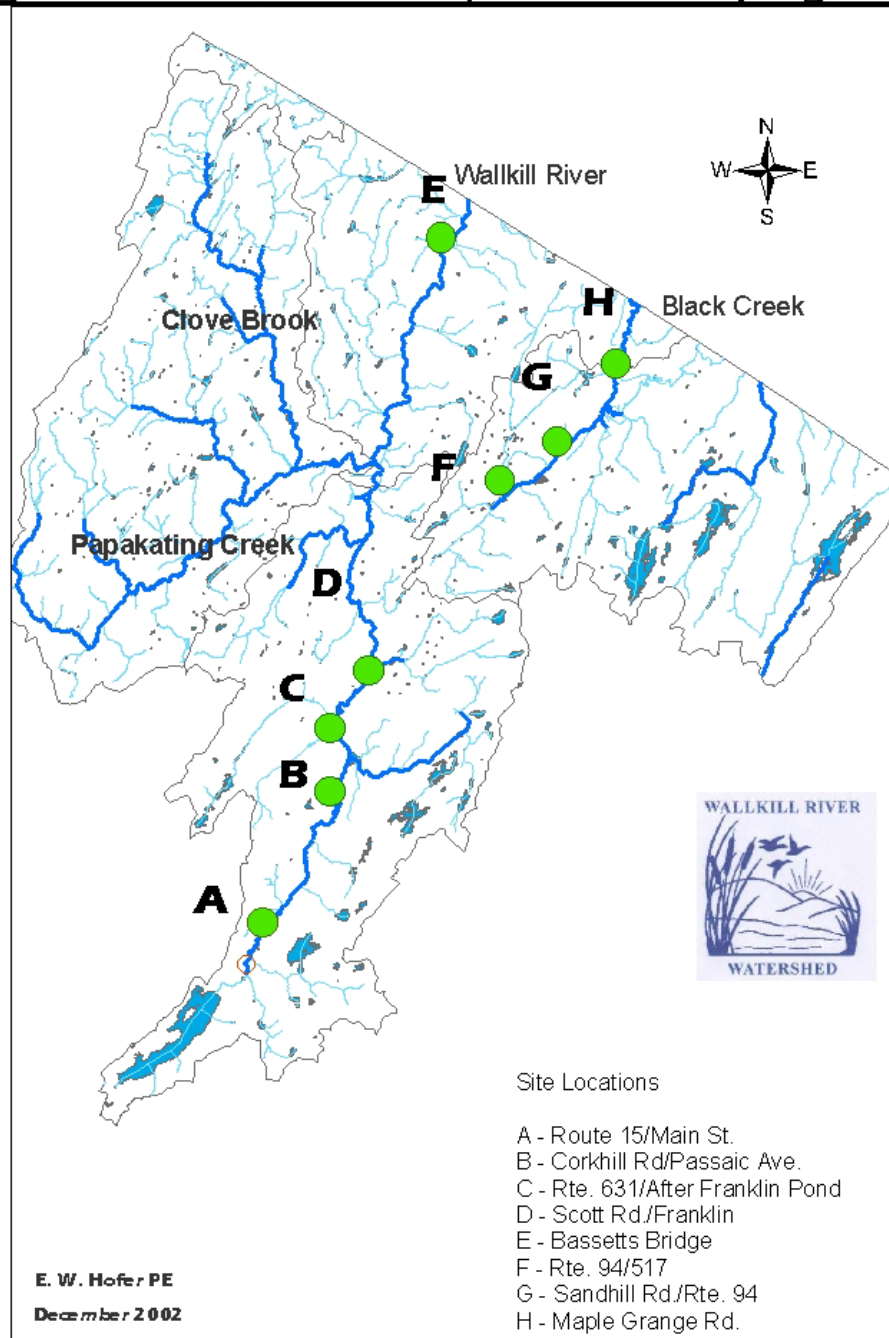


# Project Partners



# **Field Experiences**

- **Photographs**
- **Weather**
- **Safety (Number 1)**
- **Sample Collection / Logistics**
- **Pre Planning / Daily Schedules**
- **Communications**



# Field Photographs – Headwaters for Wallkill River (Lake Mohawk)









## **Two Miles Downstream – Sparta Township**





## Further Downstream - Ogdensburg



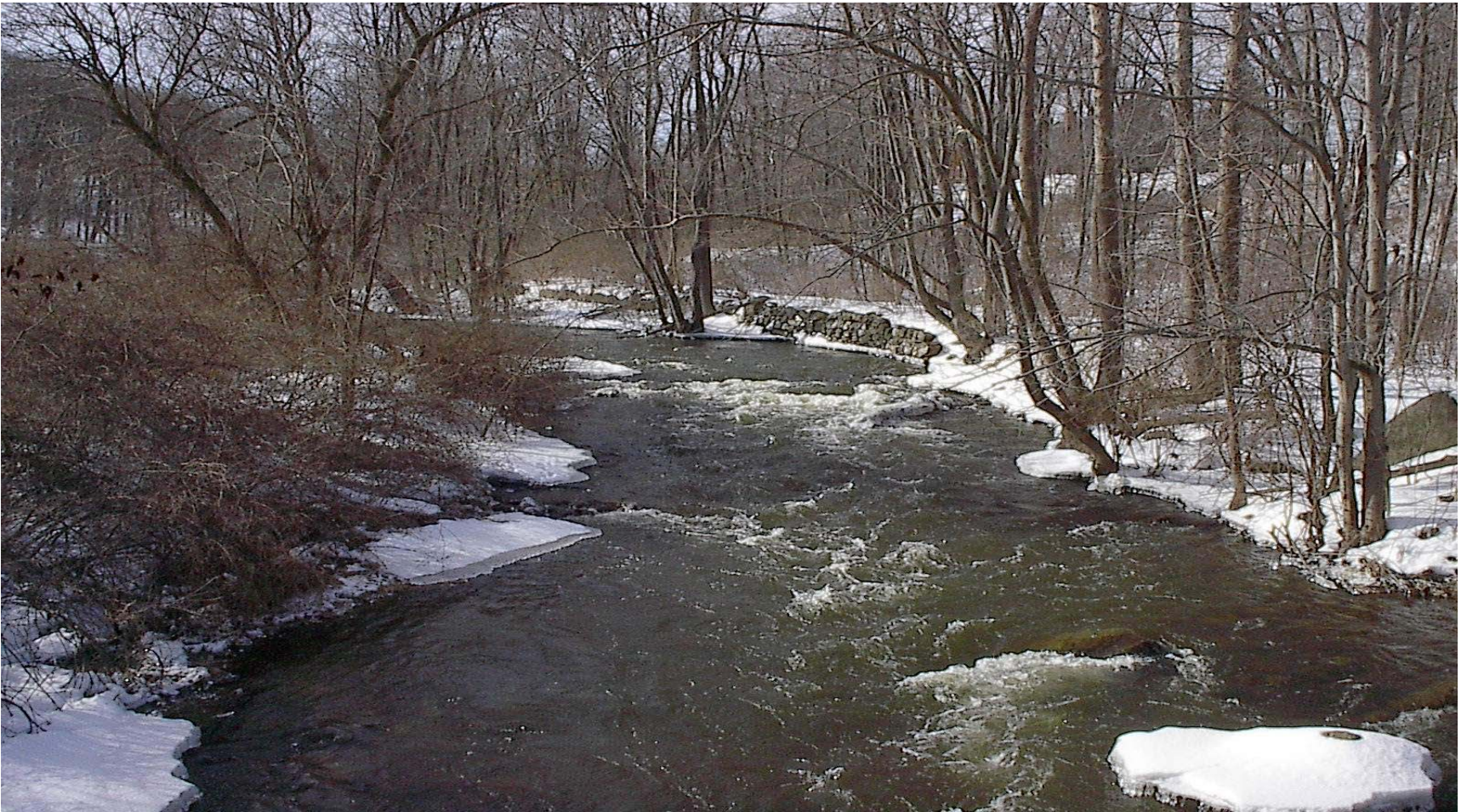


## Continuing to New York Border – Downstream From Franklin Pond



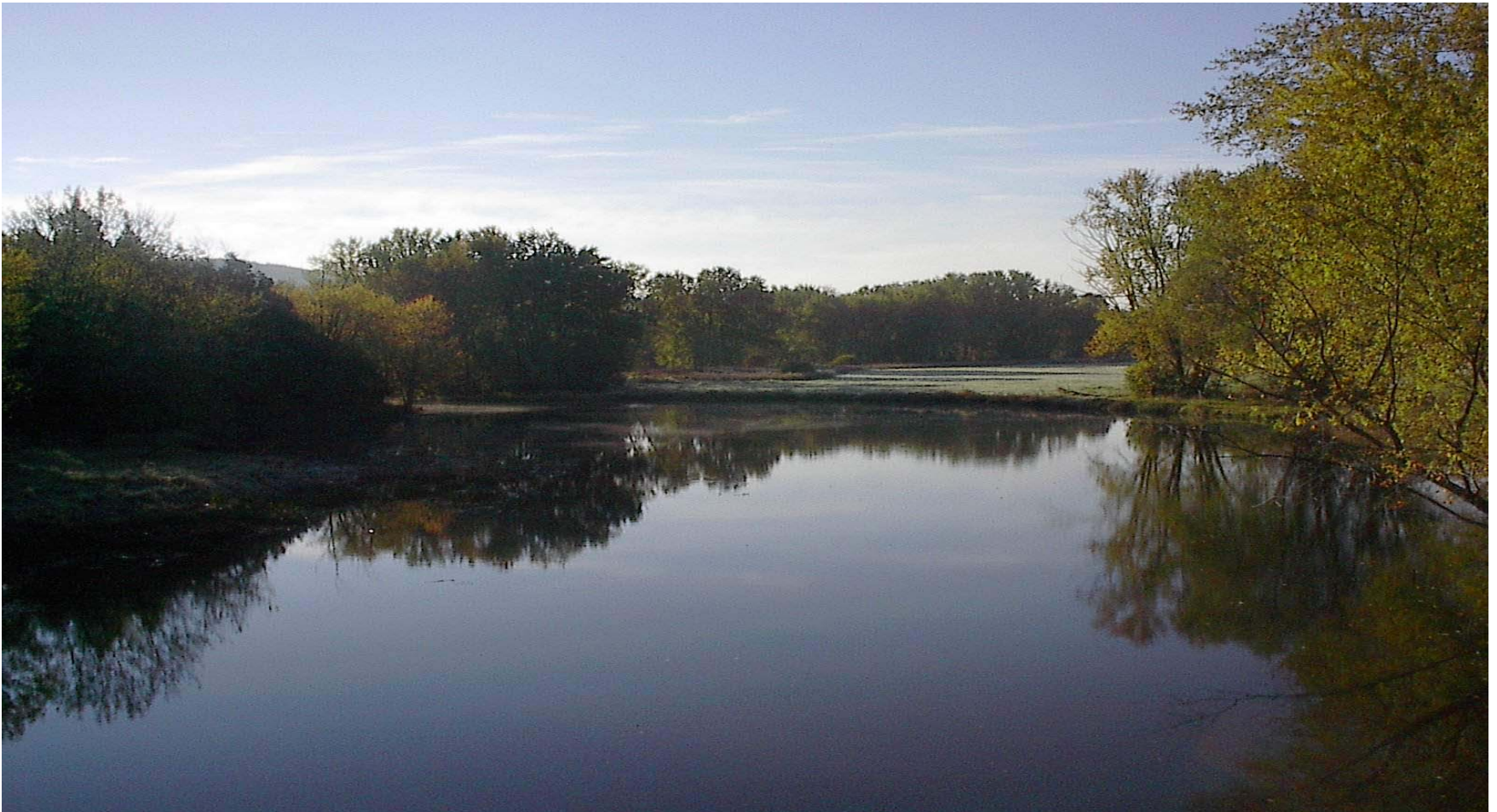


# Midway to New York Border – Scott Road





**South of New York Border – Bassetts Bridge**  
**(Wallkill River National Wildlife Refuge)**











**April 30, 2002 – The Sampling Bottles Hit  
the Water**



























# An Extra Volunteer



# Database Development

Software Programs – Word, Excel,  
PowerPoint, and Minitab (statistical)

Excel Database Table (1600 entries)

Excel Charts (Flow Rates, Parameter  
Trends)

Historical NJDEP / USGS Data

Local Volunteer Data

Field Photographs (monthly, pre- & post- storms,  
drought period, riparian corridors, etc.)



# Typical Database Summary Sheet

River <u>Site</u> <u>Parameter</u>	Surface Waters <u>SWQS</u> mg/L unless noted		Wallkill River				NM = N
			<u>A</u>				
			<u>30-Apr</u>	<u>1-May</u>	<u>2-May</u>	<u>30-Jul</u>	
			2002	2002	2002	2002	
Stream Class.							
Ammonia as Total NH3-N	To satisfy Un-ionized Limit	FW2	< 0.05	0.06	0.07	NM	
Un-ionized NH3-N	< 0.05 function T/pH/Amm Class/acute-chronic	FW2 NT	< 0.0005	0.002	0.002	NM	
TKN	< 0.02 FW2 -TP/TM No SWQS Value =NH <sub>3</sub> + organic nitrogen		1.04	2.5	0.71	0.87	
TP	less/equal 0.1 Duplicate Duplicate	FW2	0.02	0.04	0.08	0.05	
Ortho P	Comes from Fertilizers			0.02	0.03	0.03	
Dissolved P	less/equal 0.1	FW2	0.02				
TDS	< 500	FW2	400	354	372	416	

Note A : Non Attainment Values Noted in Red

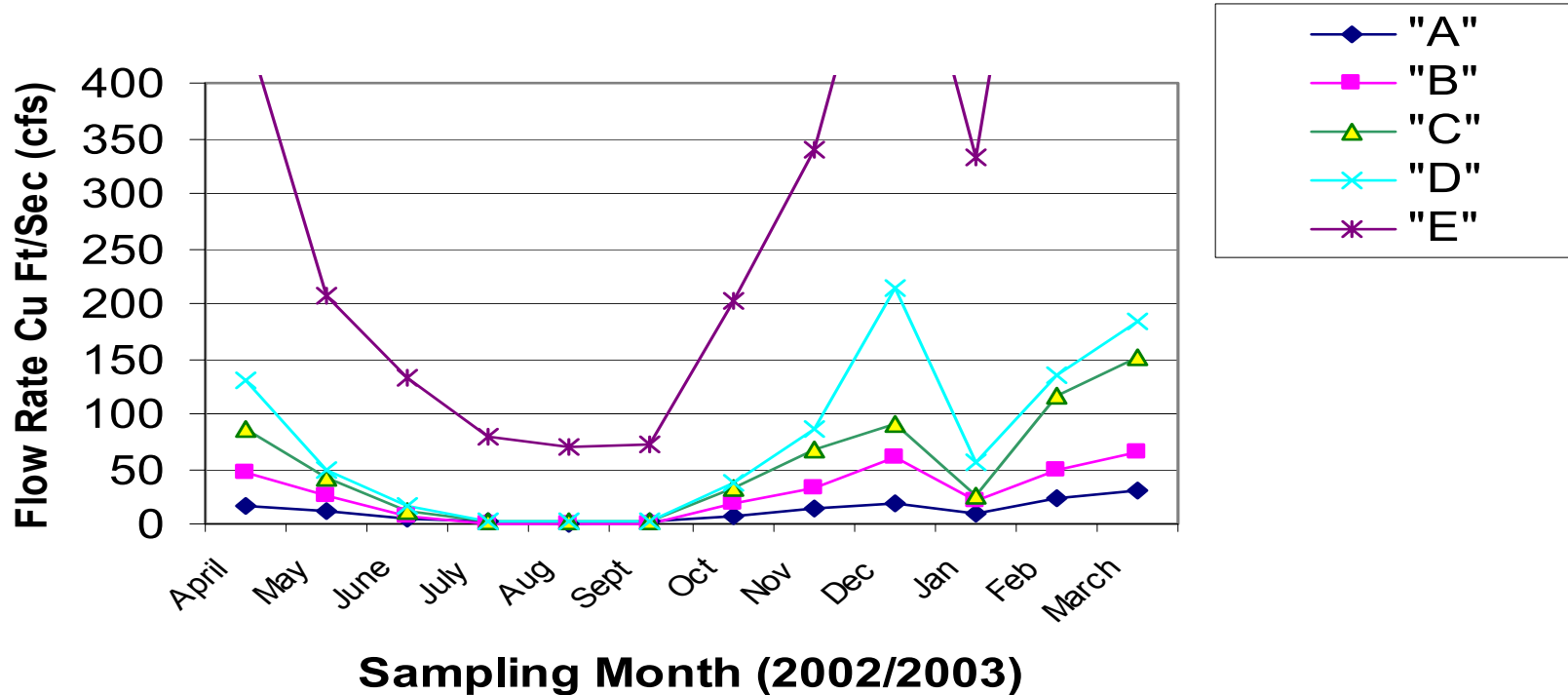
Note B : NJDE

# Typical Database Summary Sheet

<b>Nitrate</b>	less/equal 10 FW2 Replicate	0.24	0.32	0.61	1.03
<b>Nitrite</b>	Replicate	< 0.005	0.01	0.016	0.008
<b>Conductance</b>	less 800micromhos per cm; equates to diss solids of 500		625	650	759
<b>Diss Solids</b>	less/equal to 500	400	354	372	416
<b>Water Temp Degrees C</b>	Delta T from Amb +2 F TM See other Criteria	12	19	21	22
<b>Amb Temp Degrees C</b>		15	20	23.3	30.5
<b>DO (average)</b>	not less than 5 NT not less than 6 TM not less than 7 TP See other Criteria re minimum values	11.5	8.8	8	8.1
<b>pH</b>	6.5-8.5 FW2	8.1	8	7.9	7.6
<b>Flow (cfs)</b>		15.7	10.9	4.52	1.18

# Typical Chart – Flow Rates

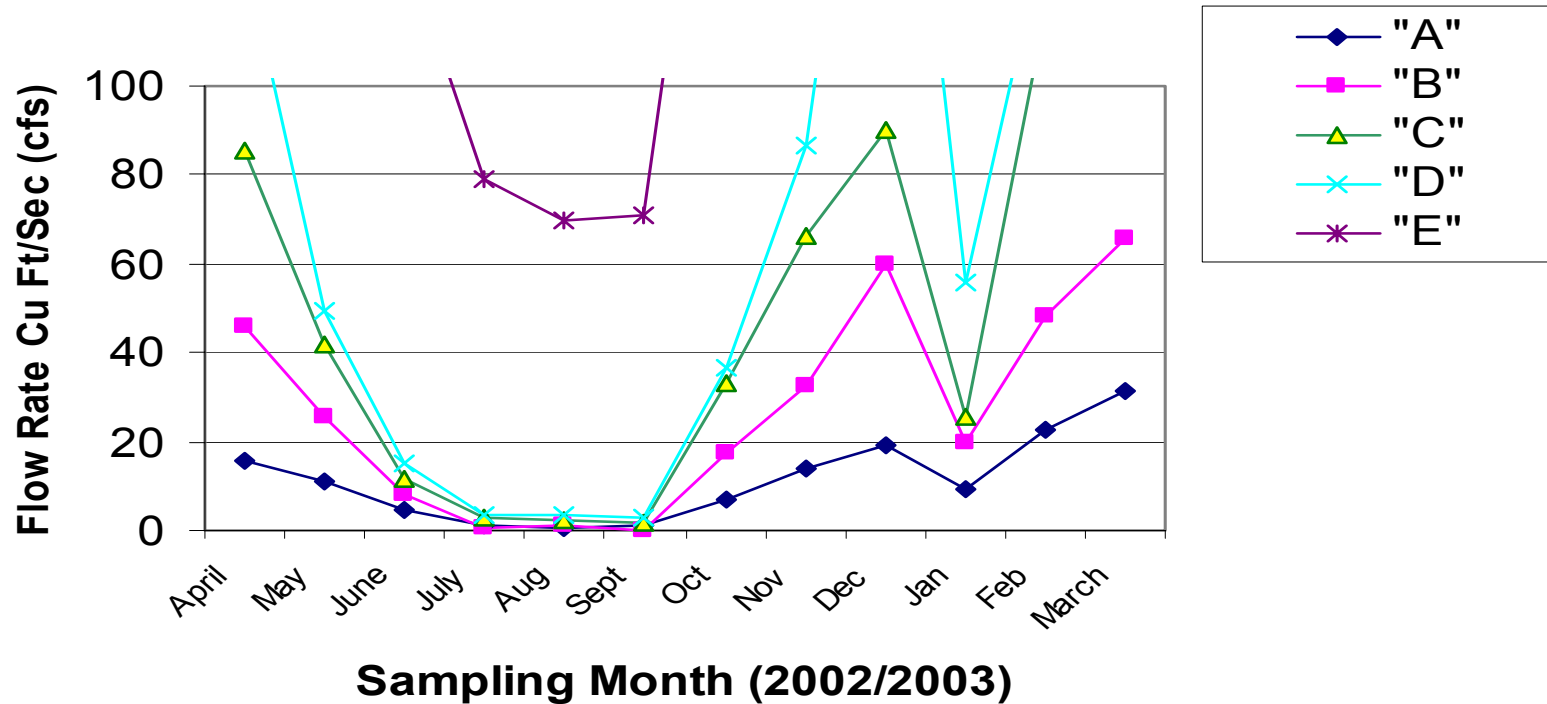
**Appendix 9 - Task B Sampling Sites - Wallkill River  
Stream Flows (cfs)**





# Typical Chart – Flow Rates

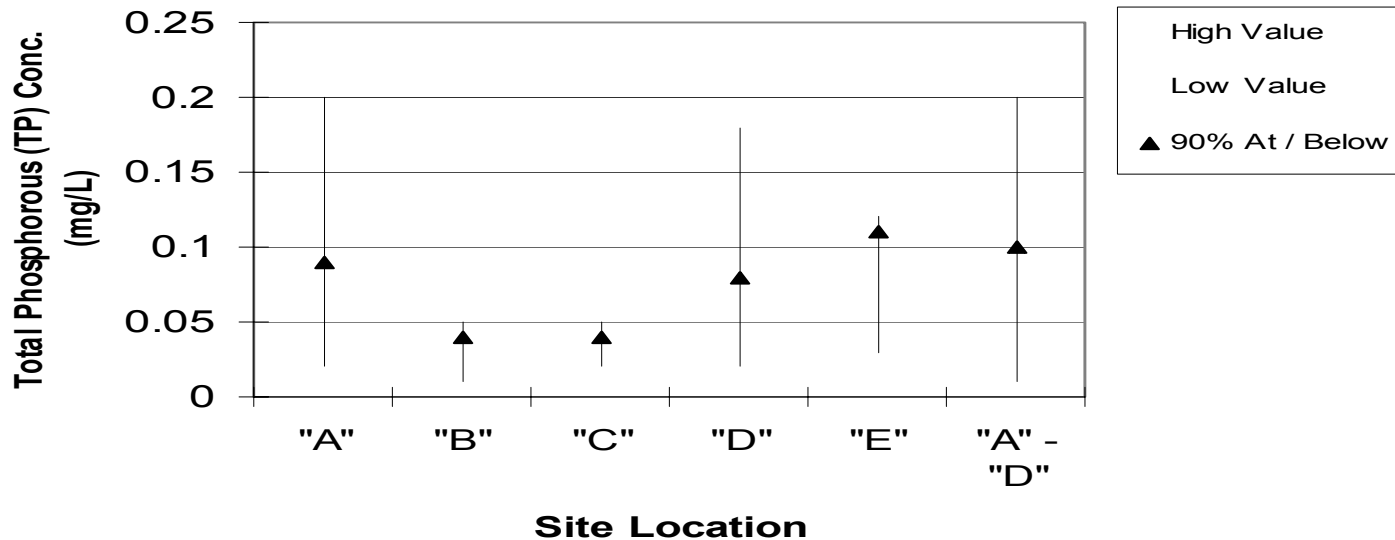
**Appendix 9 - Task B Sampling Sites - Walkkill River  
Stream Flows (cfs)**



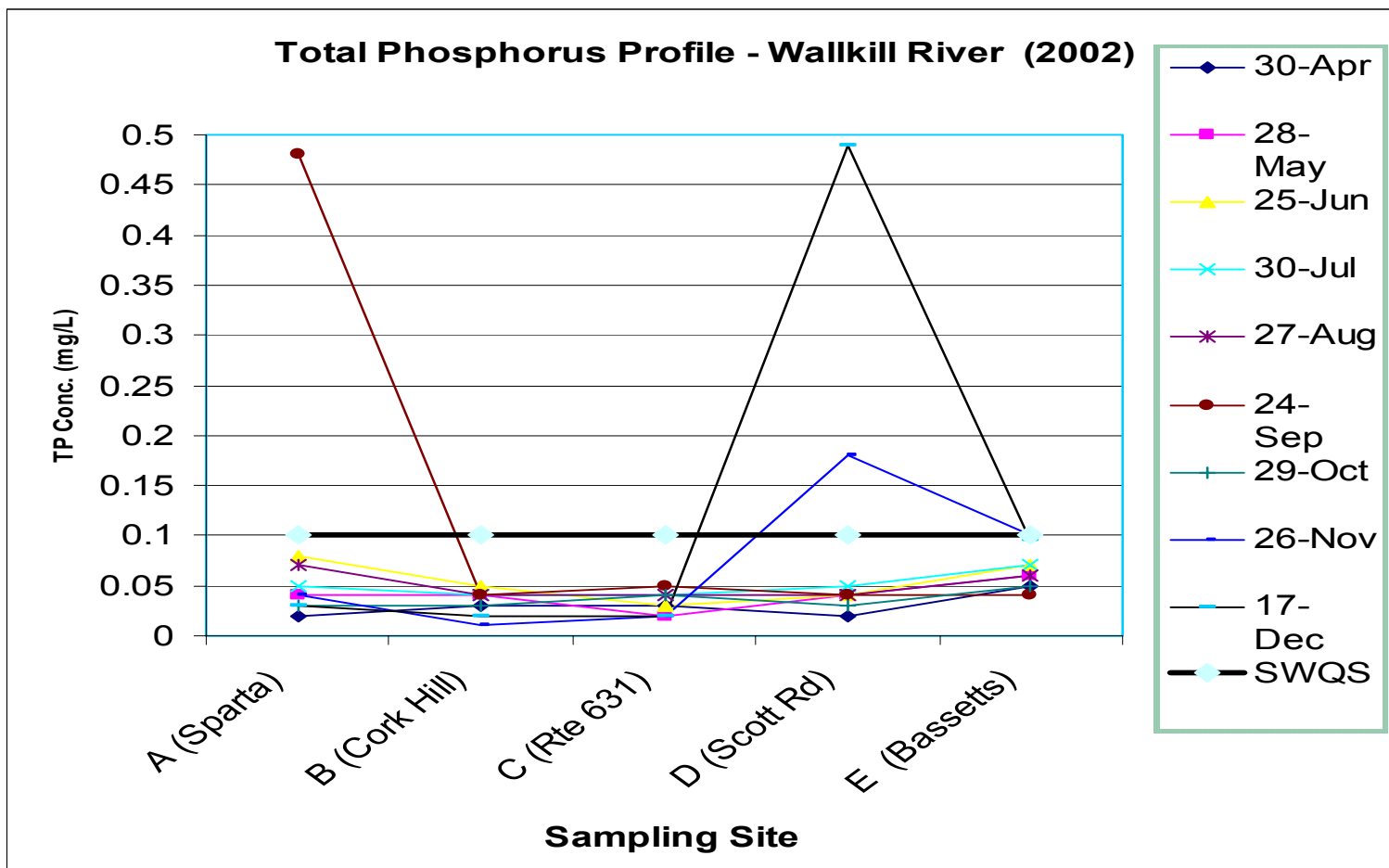
# Compliance Chart

## **Appendix 7 - Walkkill River (TP) Profile . TP Conc. At/Below 90% of Sample Results**

**Notes: 1) Two Outliers Changed to 0.1 mg/L; 2)  
Added NJDEP Data for "A" (Sparta) & "D" (Scott  
Road) Locations**



# Example – Total Phosphorous Profiles



## **Data Interpretation / Findings**

- **Data Showed Wallkill River and Black Creek to be in a Relatively Healthy State with Respect to Parameters Assessed**
- **Provided Basis for Reassigning Two Sites from Sublist 5 for Total Phosphorous Impairment to Sublist 1 (fully attaining)**
- **Found Exceedances for Water Temperature & Dissolved Oxygen at Two Different Sites**
- **Recommended Further Sampling on Black Creek, Papakating Creek, & Clove Brook**
- **Recommended Additional Parameters for Sampling**

## **Value Generation**

- **Augmentation of NJDEP Database**
- **Expanded Current 5-year Data Span**
- **Input for Watershed Management Plans**
- **Local Townships) / Community Buy-In**
- **Use in Local Planning Activities**
- **Input For 2004 Integrated List**
- **Data Sharing with Local Lake Associations**

# **Lessons Learned**

- **Safety (Number 1!)**
- **Plan - Plan - Plan**
- **Cost Effectiveness Driven**
- **Right / Correct Equipment & Clothing**
- **QA / QC Driven - Focus on Details**
- **Volunteer Training / Support**
- **Communications**
- **Continuously Show Value**
- **Total Community Involvement**
- **Team / Partnership Building**
- **Recognition (never enough of this)**

## **Sustaining the Sampling Plan**

- **Communications**
- **Sharing Results & Experiences**
- **Achieving Benefits / Value**
- **Community Presentations**
- **Press Articles**
- **Frequent Buy-in from PAC Organization**
- **Synergy with NJDEP Initiatives**
- **One-on-one Contacts with Donors of In-kind Services**
- **A Never-Give-Up Mentality**

## **Program Extension for 2003 / 2004**

- **In support of TMDL Initiatives,  
2004 Integrated List / WMA 02 Mission**
- **Quarterly / Monthly Chemical Monitoring**
- **Fecal Coliform / Coliphage Sampling**
- **Additional SWQS Parameter Monitoring**
- **Diurnal Oxygen Monitoring**
- **Headwaters / Surface Waters Land Use &  
Land Cover Characterizations**



# **Acknowledgements**

- **All Our Volunteers**
- **Health Directors of Sparta Township, Sussex County, & Vernon Township**
- **Leadership Team (SCMUA, NJDEP, HydroQual Inc., Garden State Laboratories, and WMA 02 Personnel)**
- **Support Personnel from USGS, Sussex County's Weather Consultant, & Sussex County Departments**
- **Representatives from Municipal Townships / Environmental Commissions / 208 PAC Organization**
- **Watershed Community / WMA 01 Input**
- **Lake Associations**

# Our Team

R D'Aries	J Bale	C Ogden	G Holzer	L Herland	SCMUA Commissioners
G Osias	E Seabold	J Hatzelis	R Schopp	R Keller	J Eskilson
A Sharma	A Boltz	T Varro	N Stefano	A Borisuk	J Armeno
P Morlock	J Nugent	M Al-Ebus	J Weigel	K Yezuita	G Messinger
W Dunn	L Daly	<b>J Aspinwall</b>	A Brees	F Smith	C Hall
J Deriu	D Webb	T Romagna	B Koppenal	F Gallgan	P Cerenzio
P Kehrberger	F Reisen	M Ferko	A Carew	T Jable	N Sajdak
H Klein	M Coppolella	K Klipstein	G Grey	R Susman	E Hofer 50

# A Measure of Success – Getting Your Data Accepted by NJDEP

2004 Integrated List - Page 38 of Sublist 1

Two Sites Moved from Sublist 5 to Sublist 1

					Data Source
Northwest	02	Wallkill River at Sparta			WMA 02 (SCMUA), etc.
Northwest	02	Wallkill River at Franklin Pond			WMA 02 (SCMUA), etc.

# A Watershed Success